



DOE-EM/GJ916-2005

299-W15-01 (A7348) Log Data Report

Borehole Information:

Borehole: 299-W15-01 (A7348)		Site: 216-Z-5 Crib			
Coordinates (WA State Plane)		GWL (ft)¹: 223.73	GWL Date: 06/14/05		
North	East	Drill Date	TOC² Elevation	Total Depth (ft)	Type
135942.939	566554.305	05/47	679.11	300	Cable

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	2.3	8 5/8	8	5/16	2.3	300

Borehole Notes:

A steel tape and caliper were used for casing measurements, and were rounded to the nearest 1/16 inch. Log data are referenced to the top of casing (TOC).

Logging Equipment Information:

Logging System: Gamma 4E	Type: SGLS (70%) 34TP40587A
Effective Calibration Date: 12/21/04	Calibration Reference: DOE-EM/GJ854-2005
Logging Procedure: MAC-HGLP 1.6.5, Rev. 0	

Logging System: Gamma 4I	Type: Passive Neutron U1754
Calibration Date: None	Calibration Reference: None
Logging Procedure: MAC-HGLP 1.6.5, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4 Repeat	
Date	06/14/05	06/15/05	06/16/05	06/16/05	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	100.0	233.0	106.0	133.0	
Finish Depth (ft)	2.0	105.0	101.0	110.0	
Count Time (sec)	100	100	100	100	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	1.0	1.0	1.0	1.0	
ft/min	N/A ³	N/A	N/A	N/A	
Pre-Verification	DE821CAB	DE831CAB	DE841CAB	DE841CAB	
Start File	DE821000	DE831000	DE841000	DE841006	

Log Run	1	2	3	4 Repeat	
Finish File	DE821098	DE831128	DE841005	DE841029	
Post-Verification	DE821CAA	DE831CAA	DE841CAA	DE841CAA	
Depth Return Error (in.)	0	- 2	N/A	0	
Comments	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.	

Passive Neutron Logging System (PNLS) Log Run Information:

Log Run	5	6 Repeat			
Date	06/16/05	06/16/05			
Logging Engineer	Spatz	Spatz			
Start Depth (ft)	179.0	40.0			
Finish Depth (ft)	2.0	25.0			
Count Time (sec)	N/A	N/A			
Live/Real	N/A	N/A			
Shield (Y/N)	N	N			
Sample Interval (ft)	1.0	1.0			
ft/min	1.0	1.0			
Pre-Verification	DI222CAB	DI222CAB			
Start File	DI222000	DI222169			
Finish File	DI222168	DI222184			
Post-Verification	DI222CAA	DI222CAA			
Depth Return Error (in.)	- 3	0			
Comments	None	None			

Logging Operation Notes:

Pre- and post-survey verification measurements for the SGLS were acquired using the Amersham KUT (^{40}K , ^{238}U , and ^{232}Th) verifier with serial number 115. A centralizer was installed on the sondes.

Passive neutron logging was also performed in the borehole. This logging method has been shown to be effective in qualitatively detecting zones of alpha-emitting contaminants from secondary neutron flux generated by the (α ,n) reaction and may indicate the presence of transuranic radionuclides.

Logging was terminated at 233 ft, approximately 1 ft above the groundwater level.

Analysis Notes:

Analyst:	Henwood	Date:	06/28/05	Reference:	GJO-HGLP 1.6.3, Rev. 0
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SGLS pre-run and post-run verification spectra were collected at the beginning and end of each day of logging. All of the SGLS verification spectra were within the acceptance criteria. Examinations of data indicate that the detector functioned normally during logging, and the data are accepted.

An AmBe neutron source was used for verification measurements with the passive neutron logging system. Currently there are no verification criteria established for this system. The counts obtained from the pre and post verifications were within 1 percent.

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Verification spectra were used to determine the energy and resolution

calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G4EApr05.xls). The casing configuration was assumed as one string of 8 5/8-in. outer diameter (OD) casing with a thickness of 5/16 in. to total depth (233 ft). No dead time or water corrections were applied to the data.

Log Plot Notes:

Separate log plots are provided for man-made radionuclides, naturally occurring radionuclides (^{40}K , ^{238}U , and ^{232}Th), total gamma and dead time, and total gamma and passive neutron. A combination plot is also included to facilitate correlation. Plots of the repeat logs versus the original logs are provided. Historical total gamma data acquired in 1959 and 1963 are plotted with the current SGLS total gamma log. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. The ^{214}Bi peak at 1764 keV is used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs , ^{60}Co , and ^{154}Eu were the man-made radionuclides detected in this borehole. ^{137}Cs was detected at a few locations near its MDL of approximately 0.2 pCi/g.

^{60}Co was detected at various depth locations between 50 and 100 ft. A maximum concentration of 0.12 pCi/g was detected at 67 ft.

^{154}Eu was detected at various depth locations between 55 and 135 ft. The maximum ^{154}Eu concentration was approximately 1 pCi/g at 67 ft.

The passive neutron detector indicated no significant neutron flux. A slight elevation in count rate (0.7 cps) was observed near the ground surface but is not believed to be related to alpha-emitting contaminants.

The historical total gamma data suggest elevated activity between 100 and 130 ft in 1959. By 1963, some of this activity had apparently decayed away. Current SGLS data indicate the existence of ^{154}Eu at these depths. Elevated activity is indicated in the 1963 data between 185 and 200 ft. SGLS data at these depths indicate slightly elevated ^{40}K concentrations, suggesting the cause of the elevated activity may be related to naturally occurring radionuclides; no man-made radionuclides were detected.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the natural radionuclides and the passive neutron.

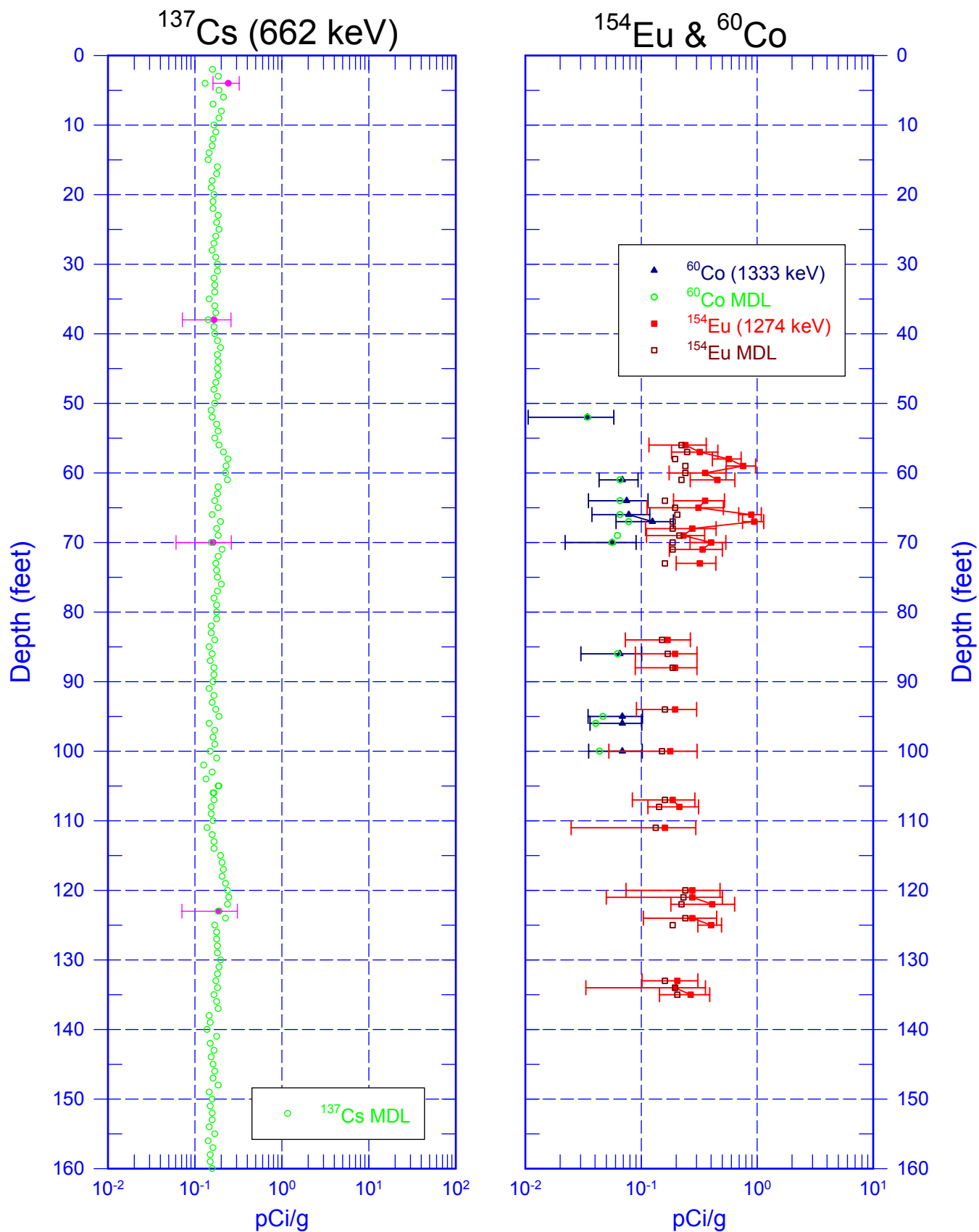
¹ GWL – groundwater level

² TOC – top of casing

³ N/A – not applicable

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Man-Made Radionuclides

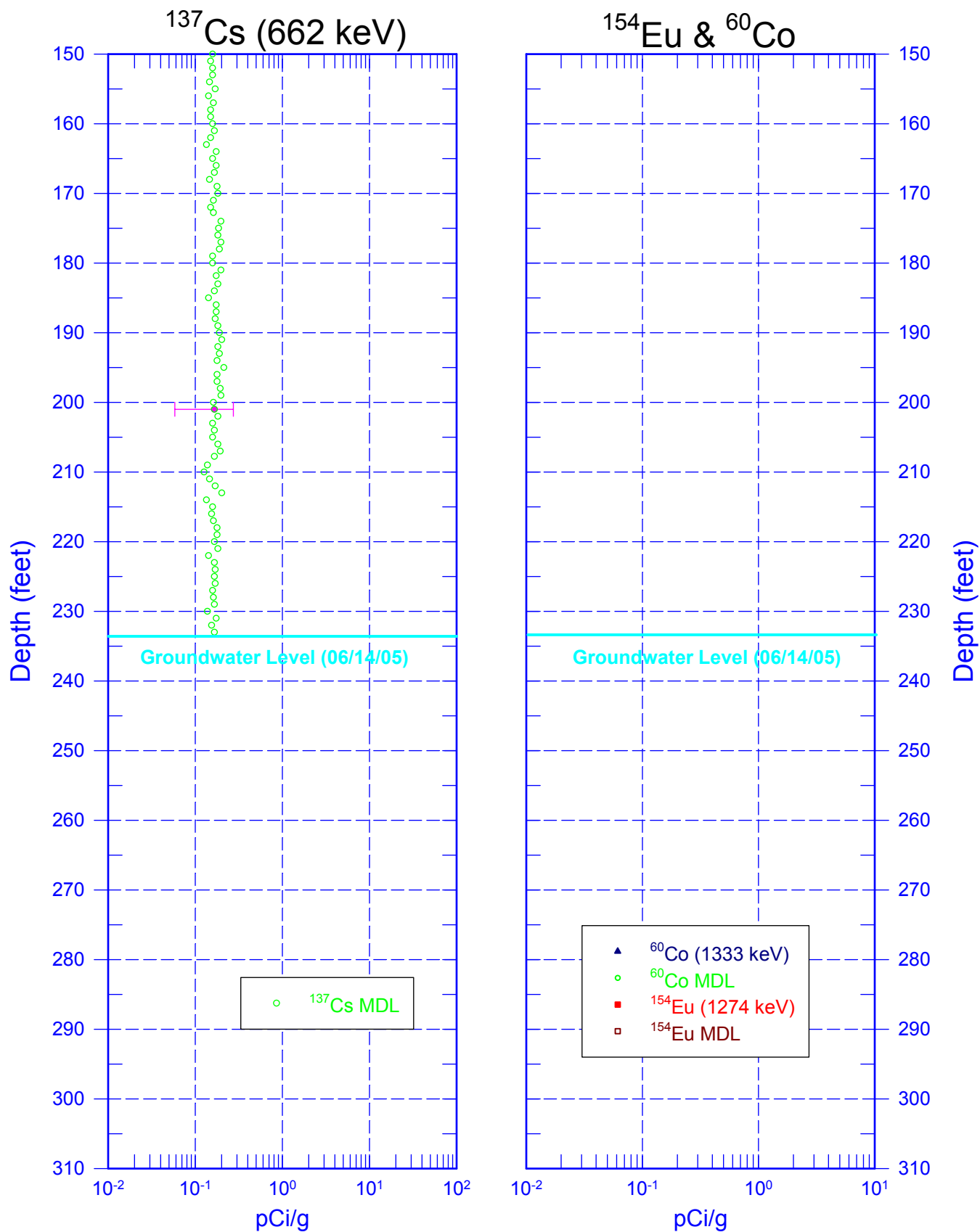


Zero Reference = Top of Casing

Last Log Date - 06/16/05

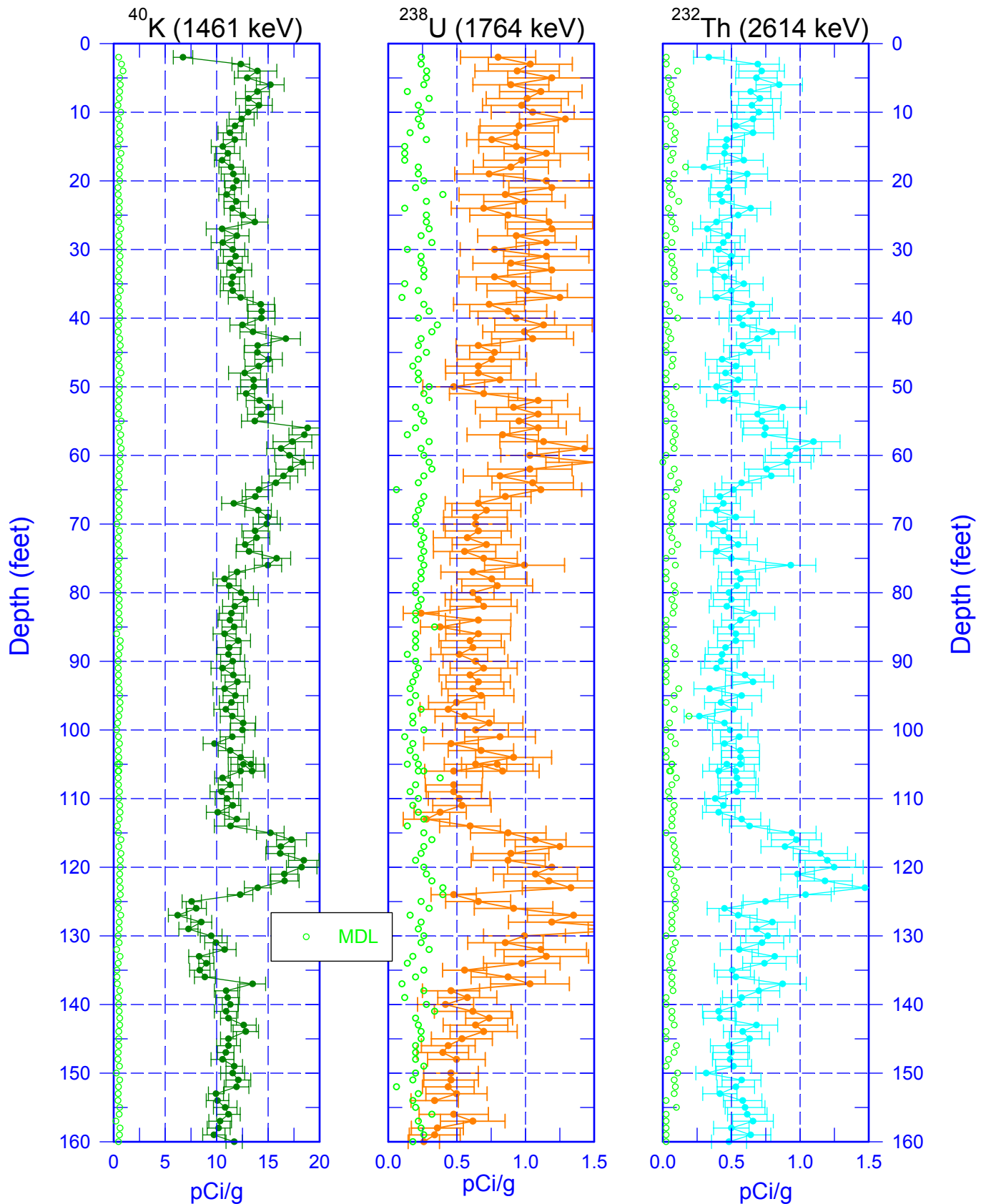
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Man-Made Radionuclides



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Natural Gamma Logs

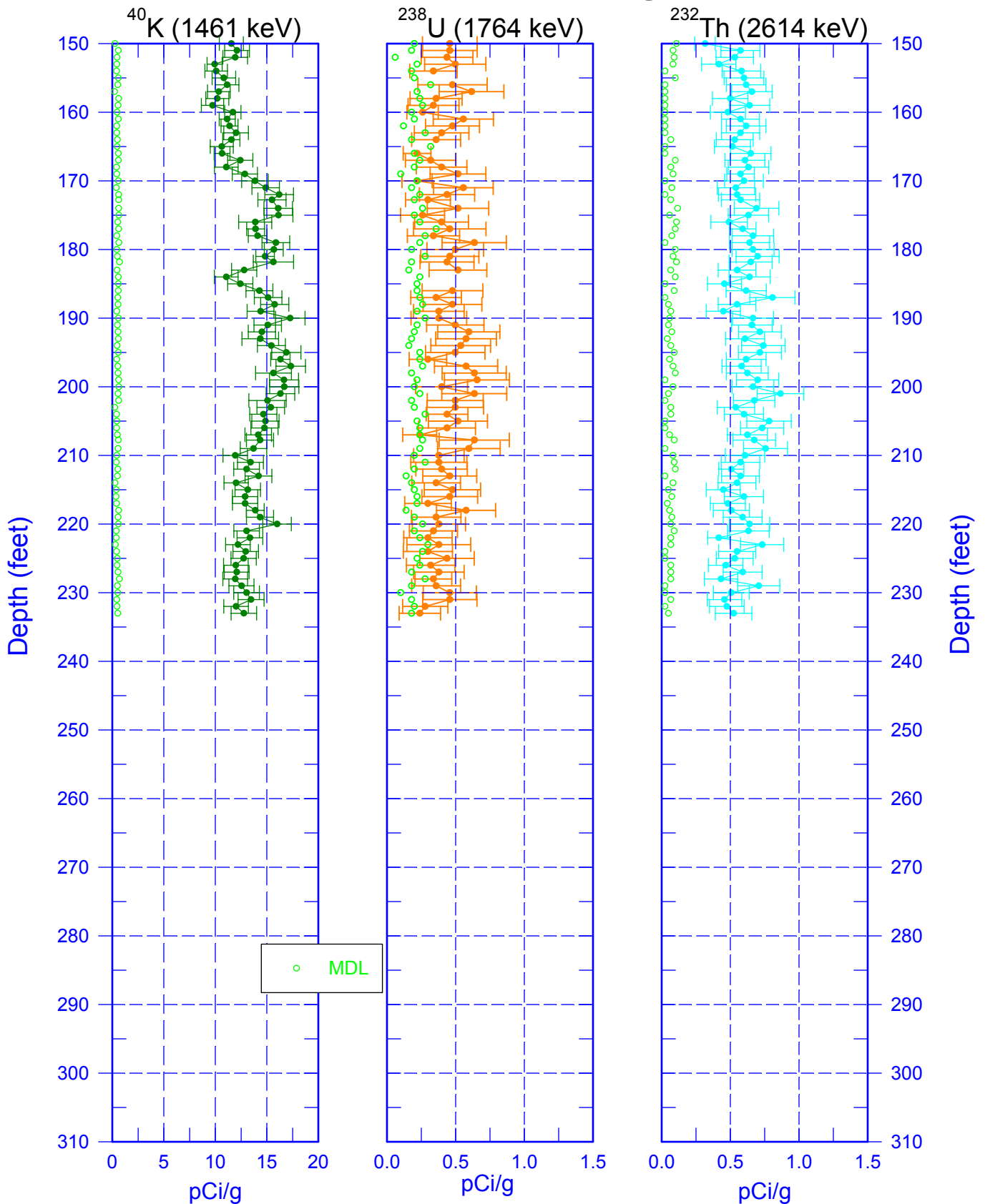


Zero Reference = Top of Casing

Last Log Date - 06/16/05

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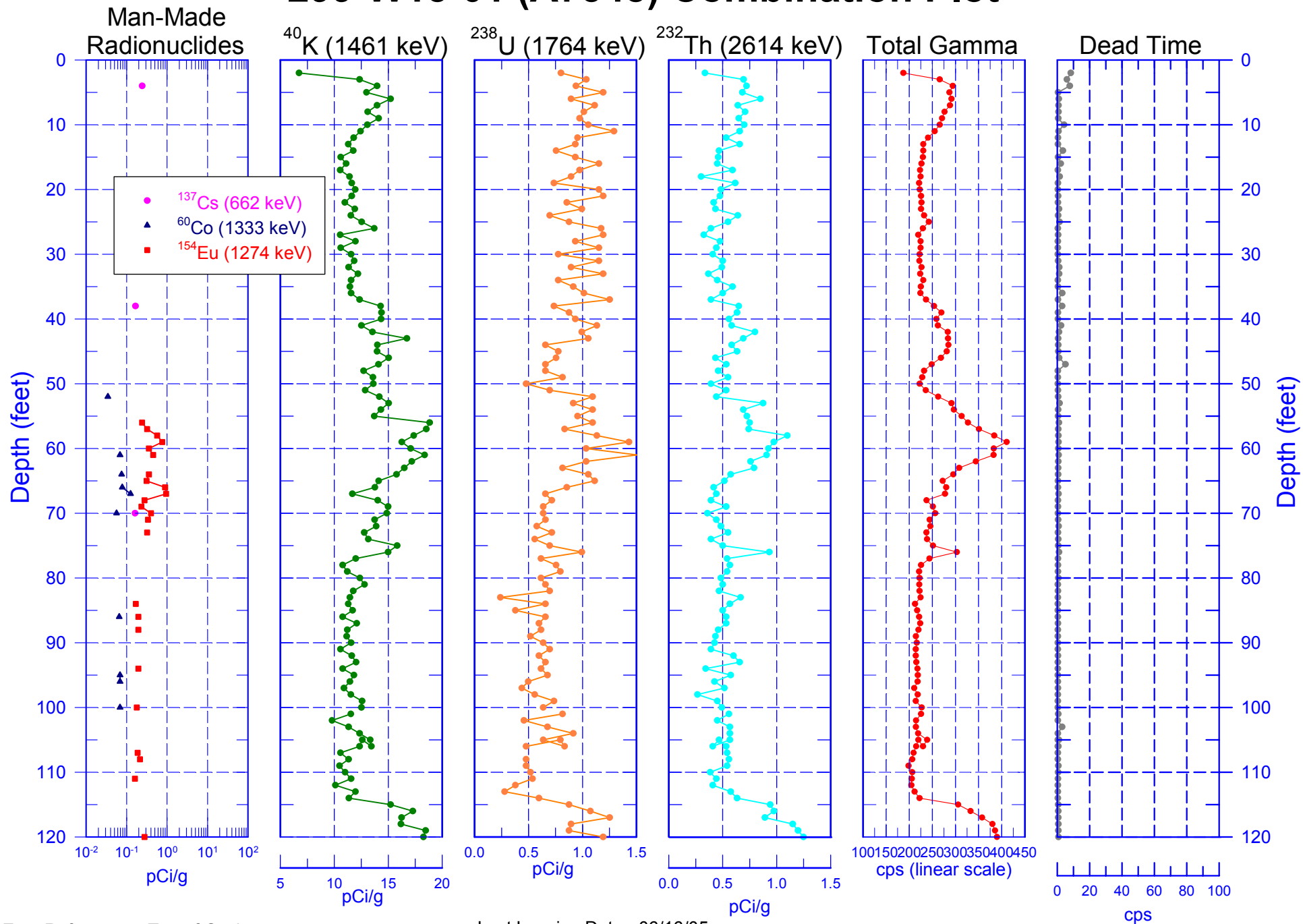
Natural Gamma Logs



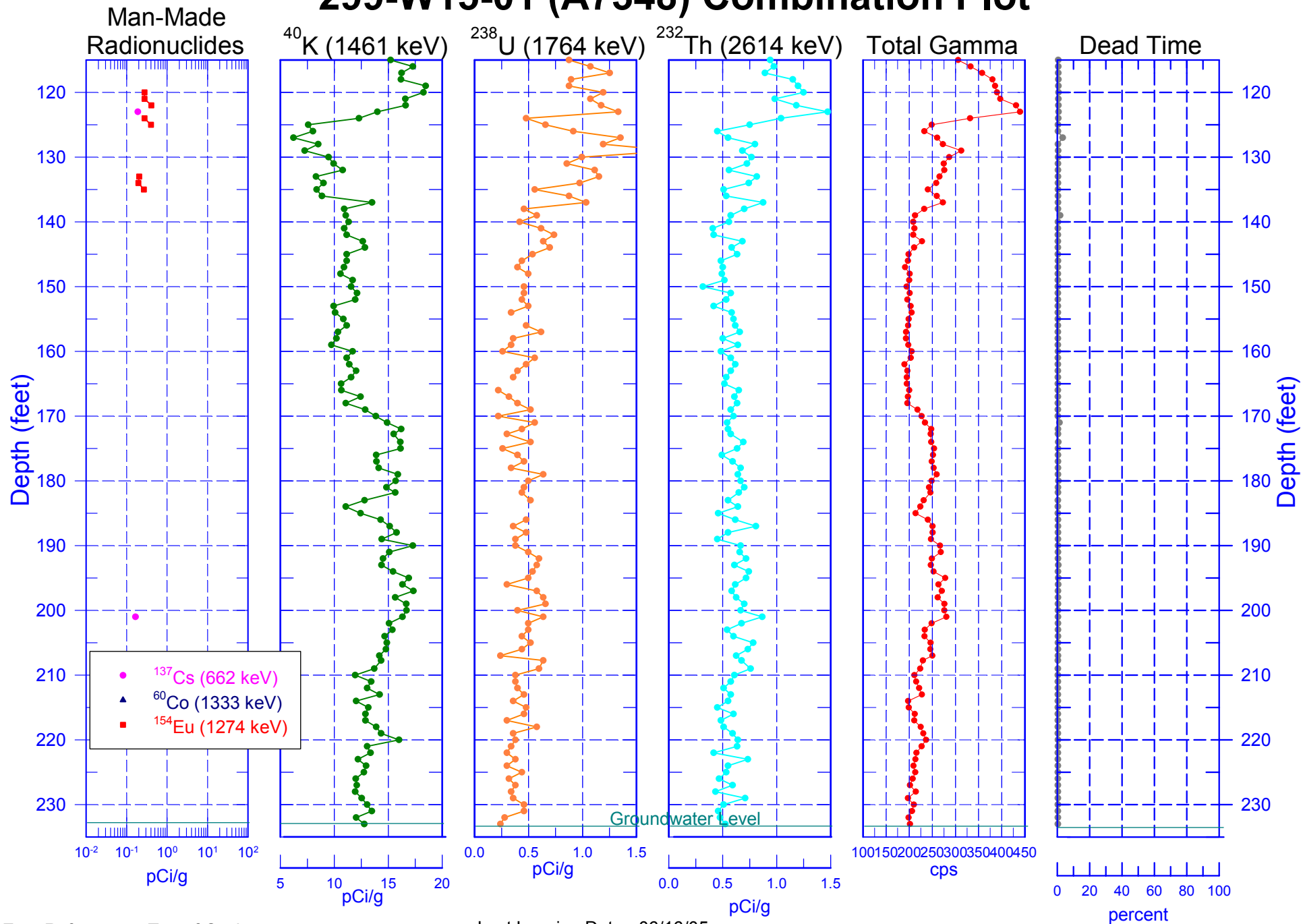
Zero Reference = Top of Casing

Last Log Date - 06/16/05

299-W15-01 (A7348) Combination Plot

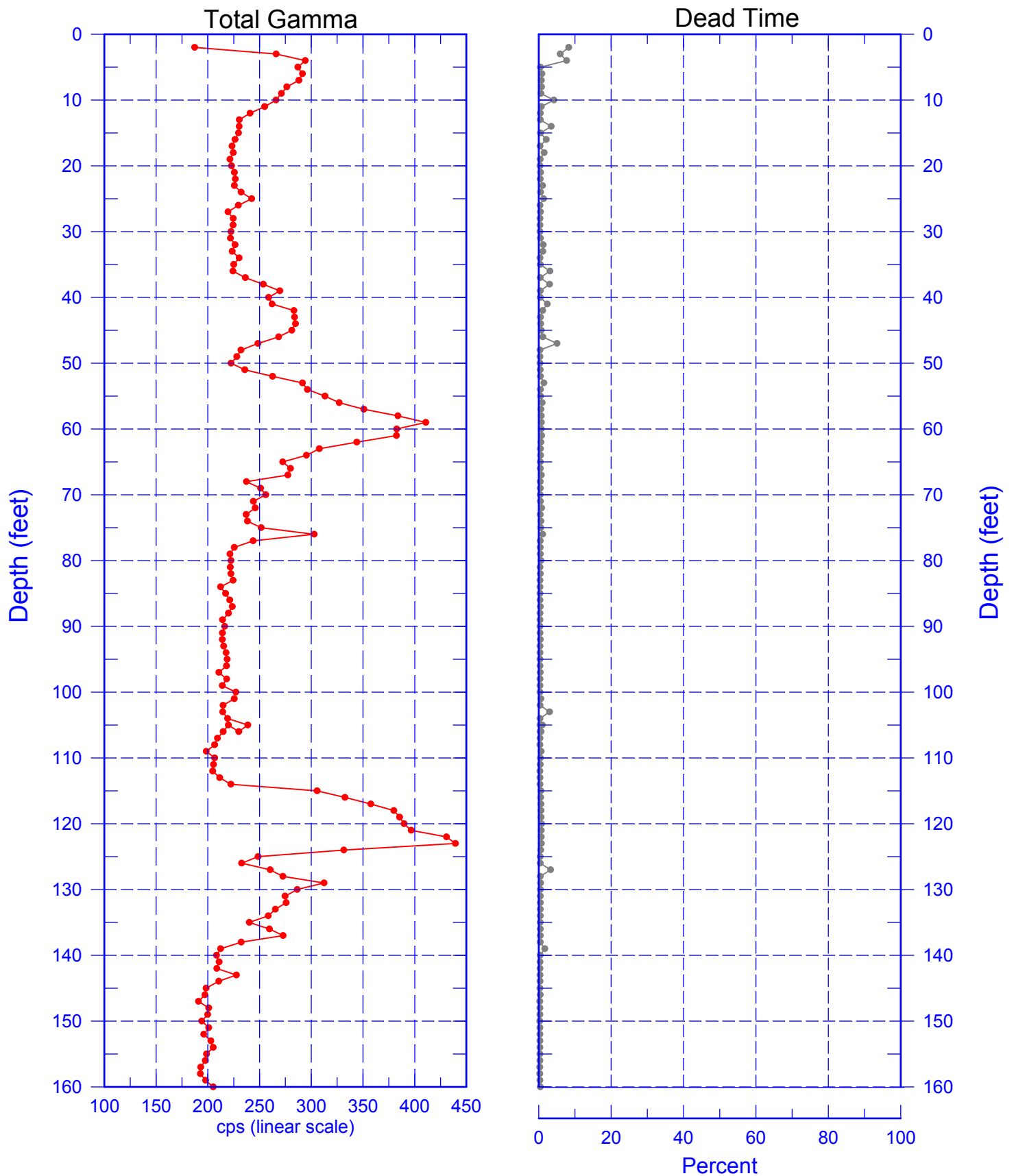


299-W15-01 (A7348) Combination Plot



299-W15-01 (A7348)

Total Gamma & Dead Time

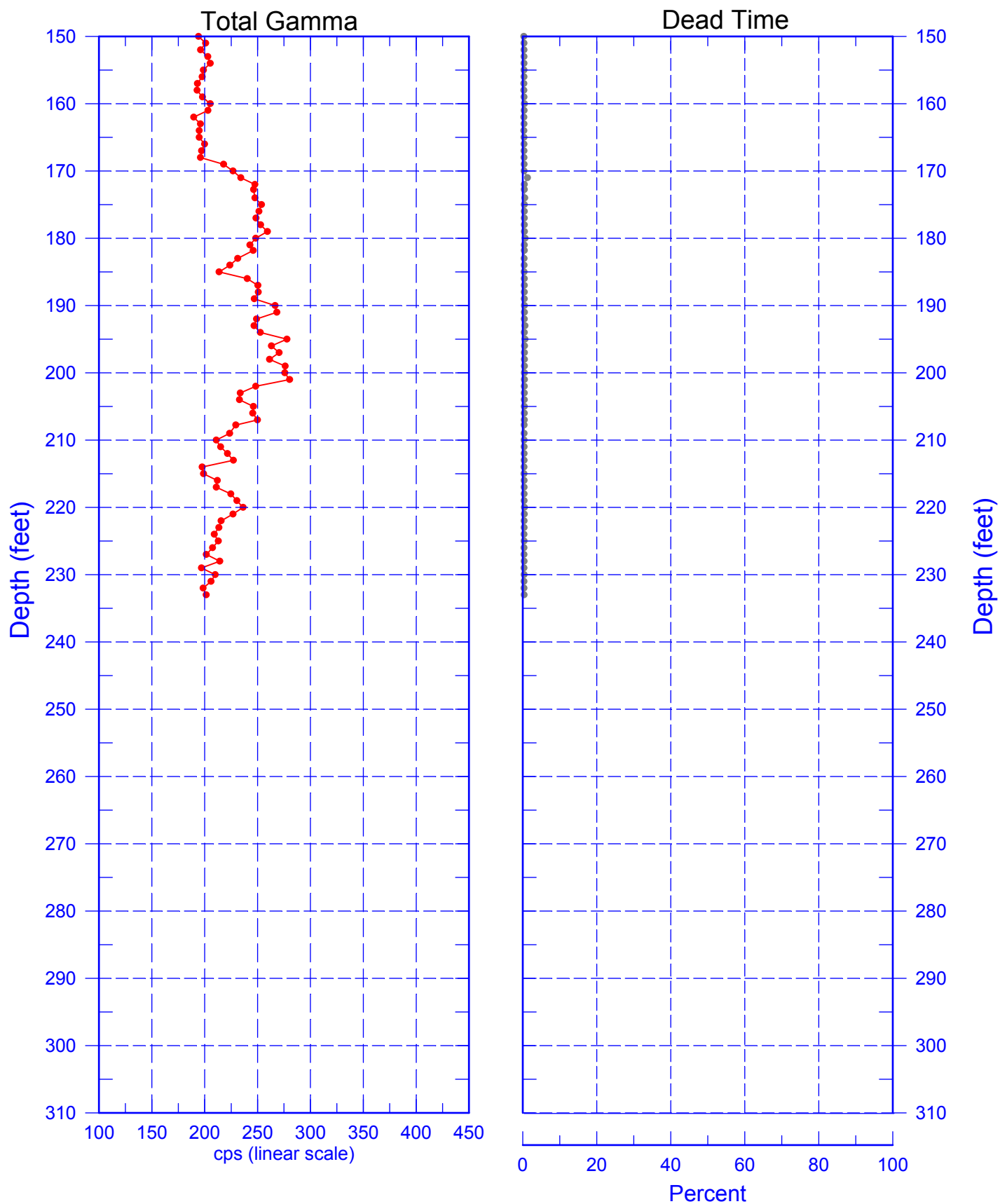


Zero Reference = Top of Casing

Last Logging Date - 06/16/05

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Total Gamma & Dead Time

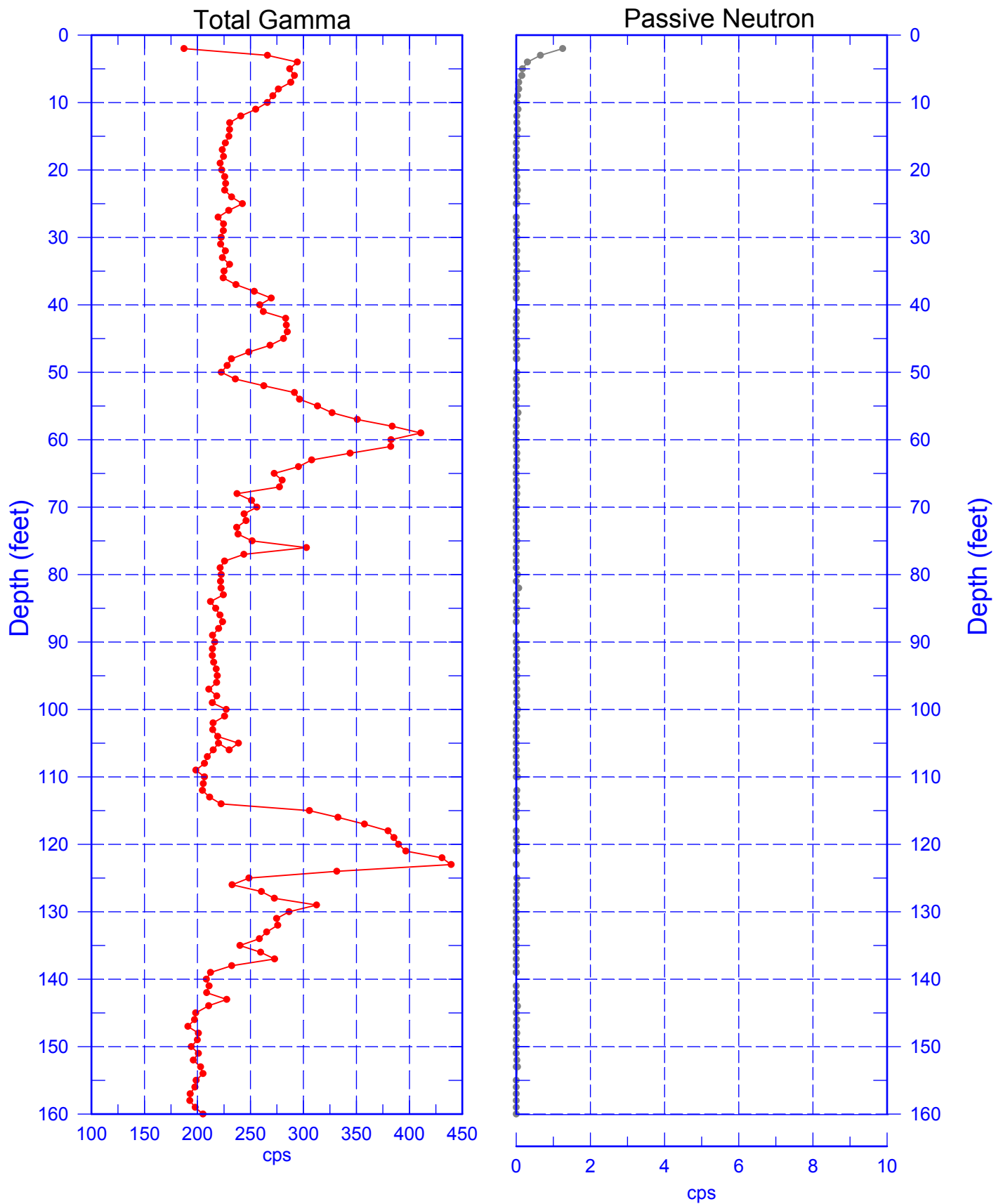


Zero Reference = Top of Casing

Last Logging Date - 06/16/05

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Total Gamma & Passive Neutron

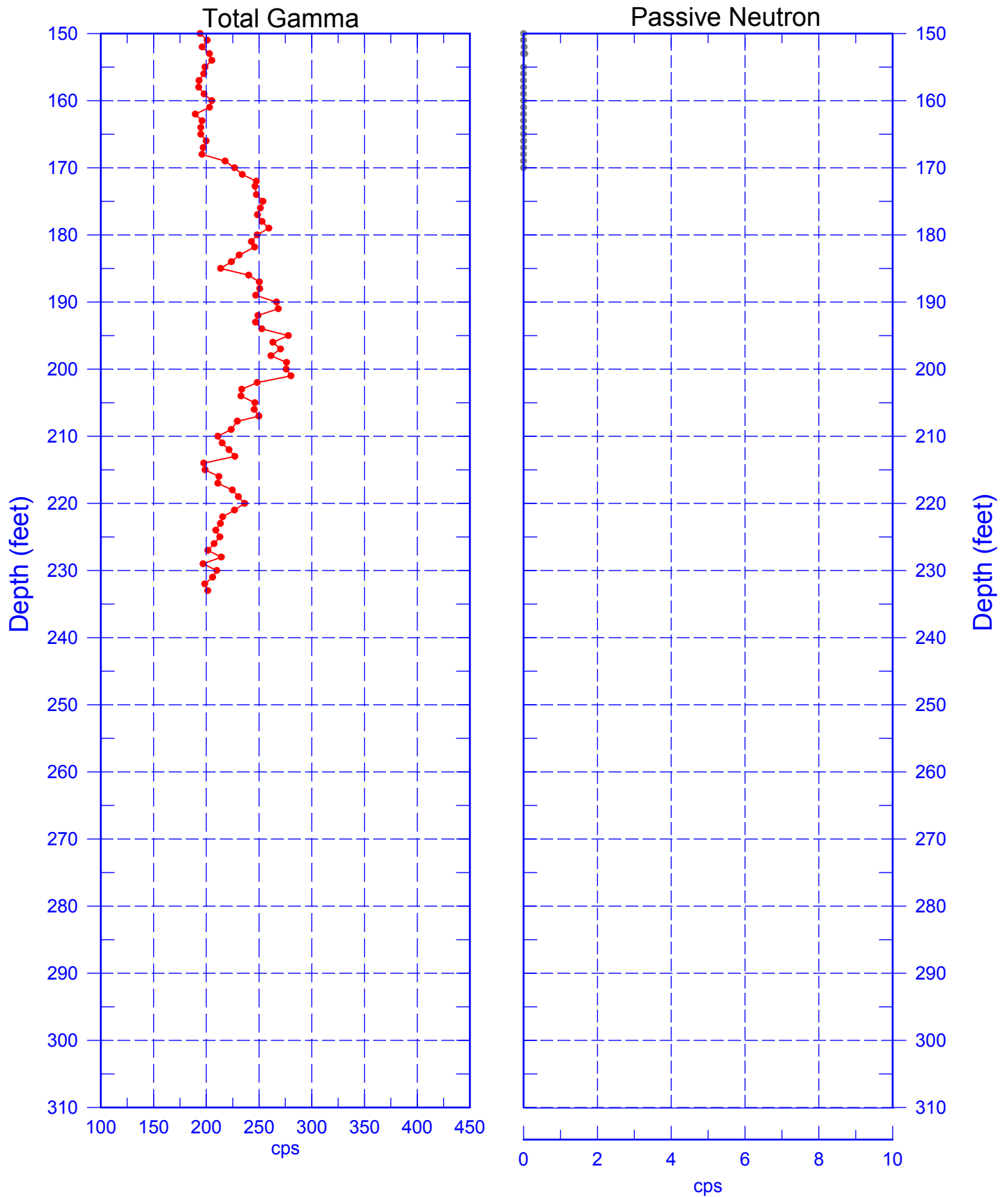


Zero Reference = Top of Casing

Last Logging Date - 06/16/05

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Total Gamma & Passive Neutron

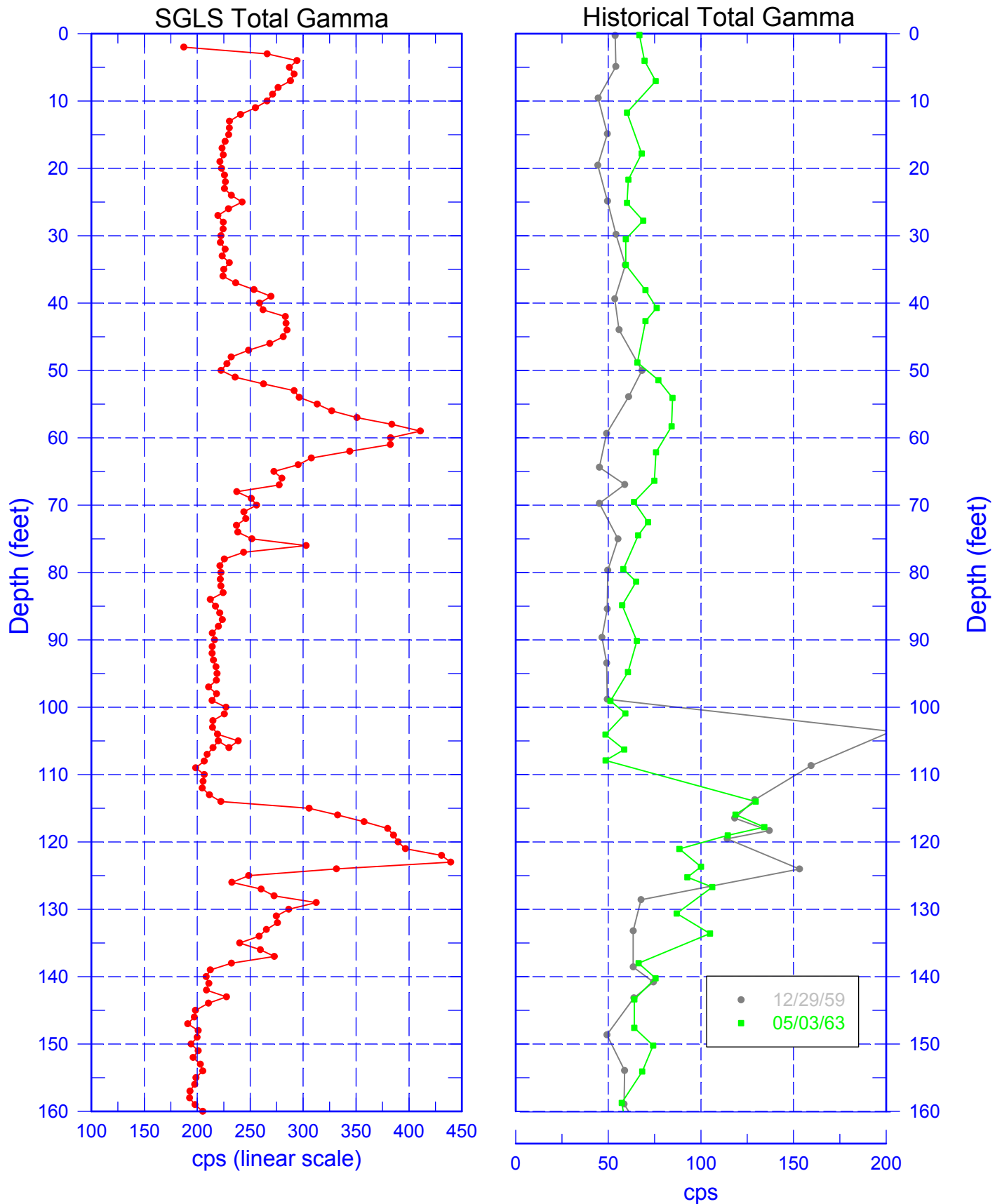


Zero Reference = Top of Casing

Last Logging Date - 06/16/05

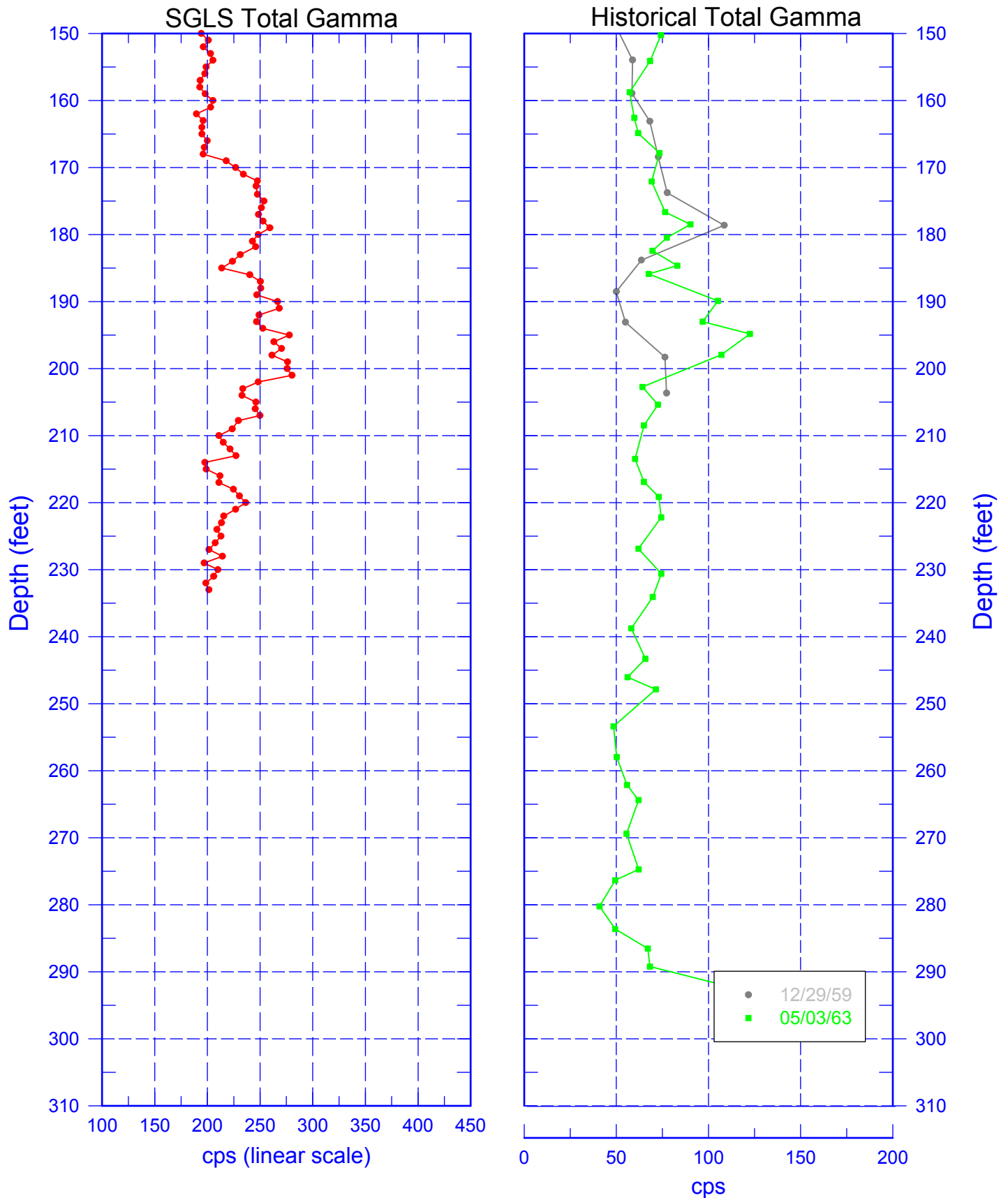
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Comparison of Historical Total Gamma Data



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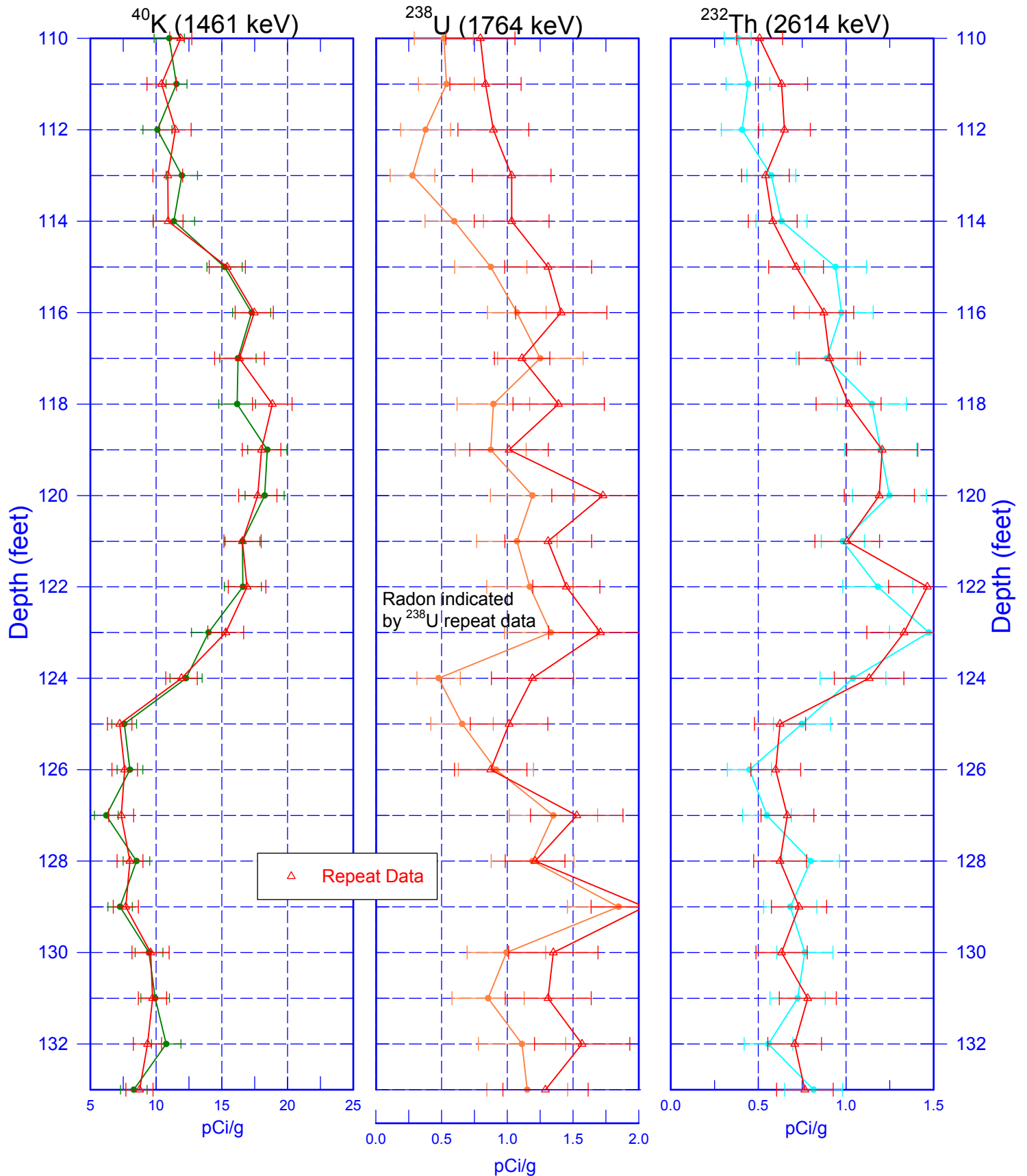


Zero Reference = Top of Casing

Last Logging Date - 06/16/05

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Repeat Section of Natural Gamma Logs



Zero Reference = Top of Casing

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Repeat Section for Passive Neutron

